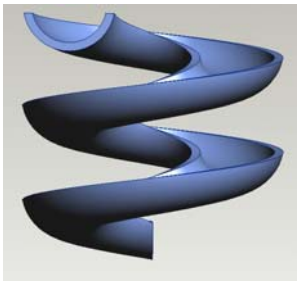
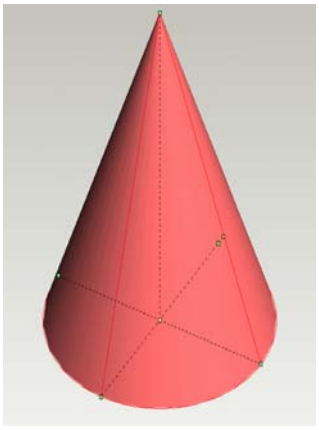
3-D Solid Modeling and Design

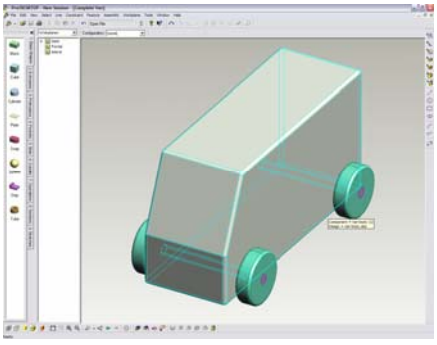
Student Learning Activities for

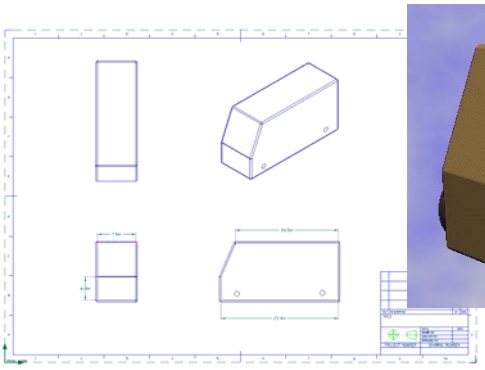
Activity #8

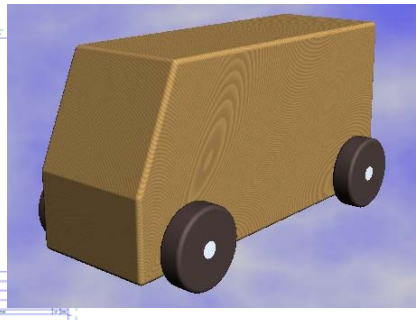
PTC Pro/DESKTOP® 8.0

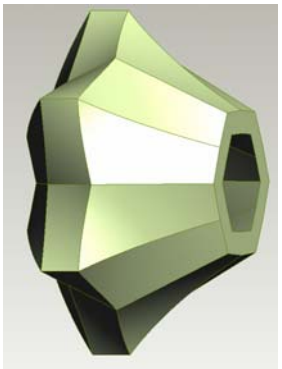












Activity 8:

Profiles and Revolving

(Flesch-Kincaid readability level = 7.6)

About the program

Pro/Desktop (called 'PD' from now on) is a powerful software program that allows you to sketch ideas first, and then work on design details later.

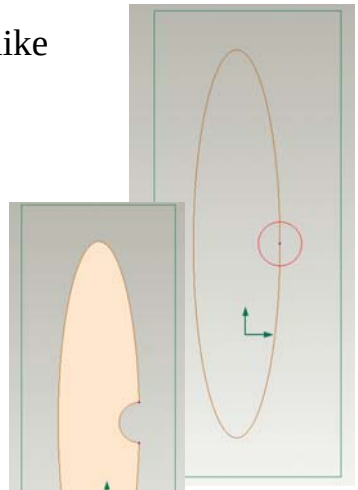
This activity will help you:

- Learn how to sketch a Profile and revolve it into a solid
- Learn how to create Section views
- Learn how to use Revolve and previous commands to create a useful product

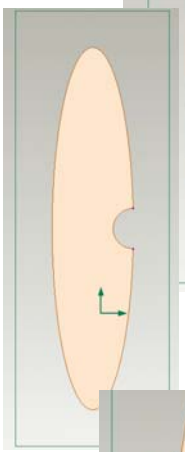
Revolve

Revolve ( )is a command that allows you to create a sketch, identify an axis point, and design a solid from your sketch that circles around that axis. Huh? Let's sketch!

Create a new sketch of the following elements and that looks like this:

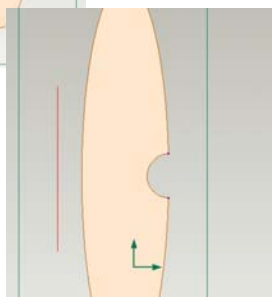


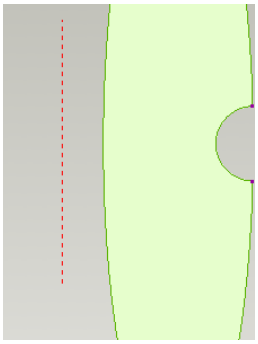
Workplane view
2" x 9" ellipse
1" Ø circle intersecting the ellipse at their midpoints as shown:



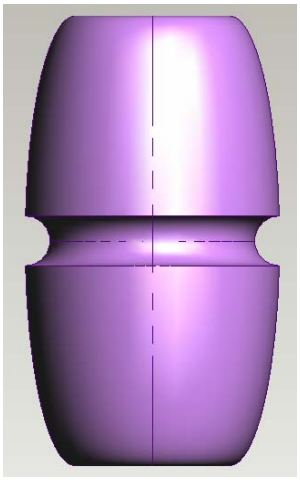
Use the Delete Lines icon to trim a small half-circle out of the side of the ellipse. When done correctly, the sketch will show as an active (colored) **profile.** Remember, a profile is a 2-dimensional shape showing a section of a design. The shape of the profile is key in determining what the solid will look like.

Now, **while holding the shift key**
to make a straight line, draw a short line just to the left side of the ellipse (length or exact location away from the ellipse is not important). You will use the line to act as the axis. The other



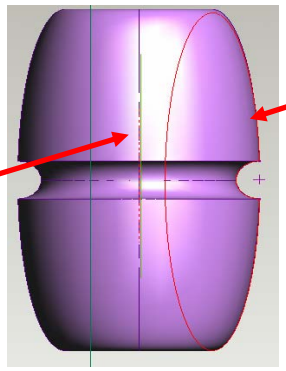


(ellipse) will be revolved around the axis to make a circular solid. To do this, you must first turn the straight line into a **Construction Line** (line that is not an actual part of the drawing but is used to build the design). Click on the straight line (axis) so that it is selected **(red).** Click on the Line pull-down menu and select 'Toggle construction' or the hot keys, Ctrl + G. The line will turn to a dashed line, indicating it is no longer a valid part of the sketch. Now, select the Revolve icon ( ) . In the dialogue box, enter the following information:



Feature Name: My first revolution
Sketch to use as profile: Initial
Select: Add material
Angle: 360
Above workplane
Click OK.

Did you think this would be the shape that appeared? Tumble the design to get a good look at it. If you think about the **profile**, you will remember that it created this design. You can see the profile and the axis line of this design below:

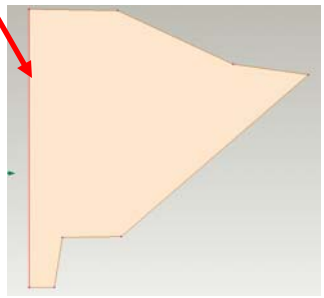


Profile

Axis
(construction line)

SAVE your design according to your instructor's directions.

What if you do not want a hole in the center of your design? You can simply use a straight edge of any profile and use it as the axis. Watch this: The left straight edge is clicked to activate it (red). This will be used as the axis around which the profile is revolved. In this case, there is no extra axis or construction line needed. The profile simply revolves around one of its own edges.



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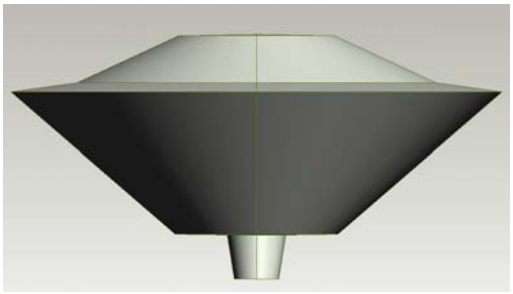
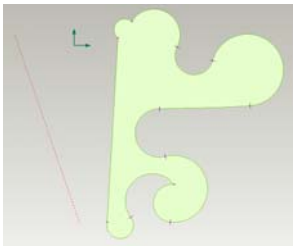
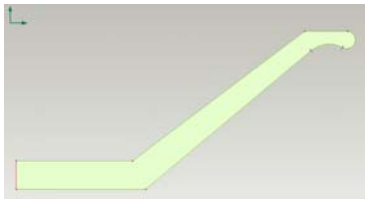
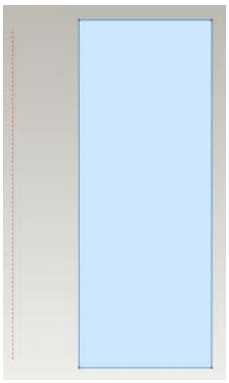
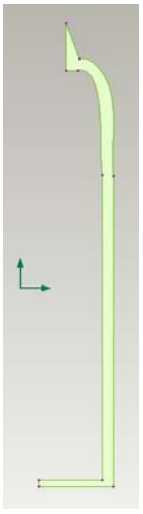


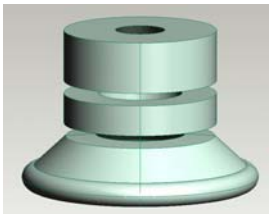
Now, look at the following **profiles** and designs. Can you tell which profile goes with which design? (hint: the designs may be rotated to a different view)

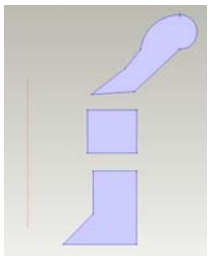


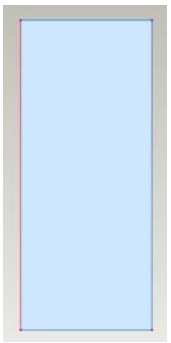


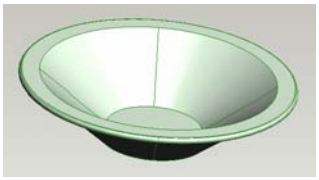










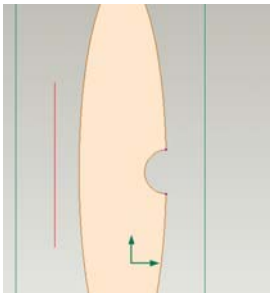
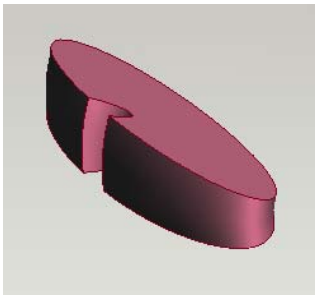
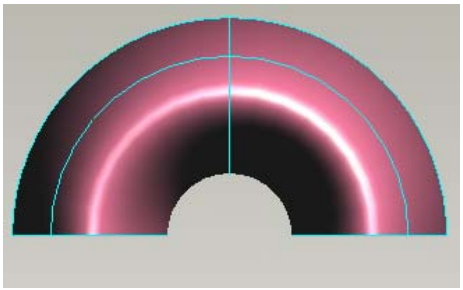


Sections

What if you do not want a complete, circular solid? Sometimes, it is necessary to only show a portion of a revolution, or a **section** of it. To do so, simply reduce the 'angle of revolution' to something less than 360 degrees. Since 360 degrees (or 360°) = 1 revolution, then 180° = ½ circle, etc.

Draw your first revolution again, with the degree of revolution at differing angles such as 45°, 270°, 359°, or 22 ½ °.

Workplane view
2'" x 9" ellipse
1" Ø circle intersecting the ellipse at their midpoints

Do not save your changes.

A Bright Idea

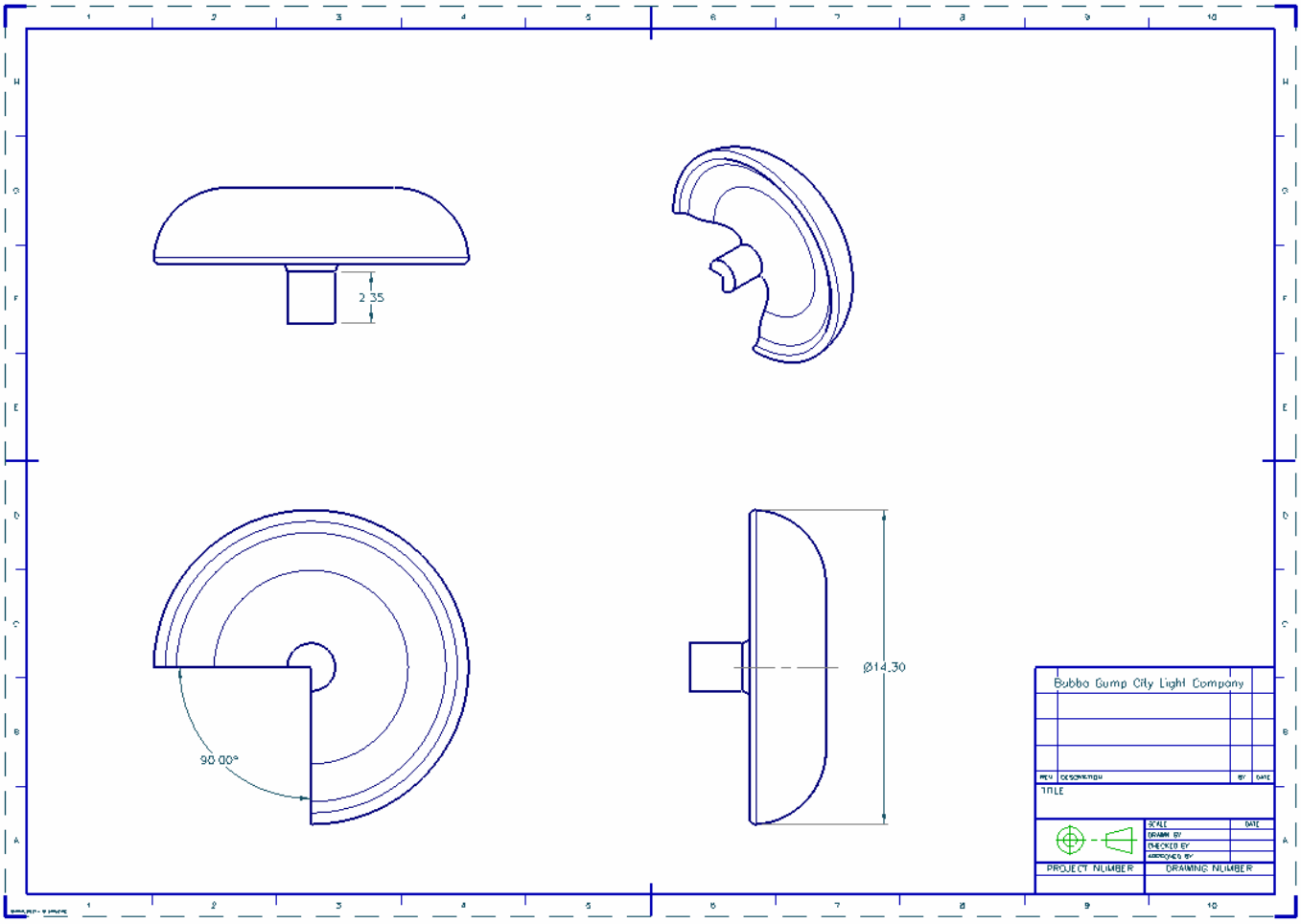
You have been hired as an industrial designer to come up with a new look for your city's street lamps. The older style lamp heads are ugly and plain. The city's budget allows for an inexpensive yet stylish design to be added to the 10' tall lamps located at every intersection and throughout the city parks.

Using the Revolve function in PD, design an attractive lamp head that has either a 3" Ø hole in the center or a 3" wide section opening so the bulbs can be put in and also replaced as needed. The outside diameter of the new lamp head cannot exceed 24".

Change the material to a non-metal (see Activity #7) that will be both attractive looking and that will withstand snow, rain, and intense sunlight. Include a photo album picture of the final design, along with an engineering drawing including at least 3 dimensions so the machine shop can begin to manufacture them. A simple example is provided on the following page.

Sample Solution:

14.3″ diameter
ceramic lamppost



SAVE your design **AND** your Engineering Drawing according to your instructor's directions.

You have completed this activity using PD! Please exit the program.